Using Remote Sensing to Assess Natural Habitat

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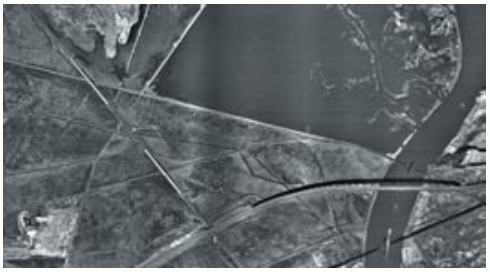
The 70-odd square miles that comprise the Hackensack Meadowlands have for centuries presented their own unique challenge to human habitation and use. The earliest roads built in the Meadowlands by colonists skirted the swamps. The first road to cross them, proposed by the New Jersey legislature in 1765, was built of logs from what remained of the Meadowlands cedar forests. Later, when the railroads laid their tracks across the wetlands, the rails went unused for a year; then if the ties had not sunk into the earth, they were deemed safe for travel. Under such circumstances, accurate maps of the Meadowlands were crucial.* Today, as ecologists seek to rectify centuries of abuse, the ability to pinpoint specific sites is even more critical.

Since the late 1970s, the U.S. Fish & Wildlife Service's (Service) National Wetlands Inventory (NWI) Program has been mapping the Nation's wetlands, and the Hackensack Meadowlands was one of the NWI's first projects. The NWI relies on aerial photointerpretation techniques to produce large-scale maps that show the location, size, shape, and type of wetlands using a 1:24,000 U.S. Geological Survey topographic map as a base. The original NWI maps of the Hackensack Meadowlands were produced by the Service from mid-1970s black and white aerial photographs (scale = 1:80,000) with a target mapping unit of about 5 acres. Given this and the fact that substantial changes have occurred in the Meadowlands since the late 1970s, these original maps are obsolete. In 2001, the Service's NWI Program initiated its Strategic Mapping Initiative to update NWI maps in priority areas. Northern New Jersey was designated as a high priority, and the NWI is compiling new maps from 1:40,000 color infrared photographs taken in 1995. Wetlands as small as one acre may be mapped.

In addition to updating the maps, the NWI is evaluating wetland trends in the Meadowlands, mapping the condition of stream corridors and wetland buffers, and evaluating the extent of remaining "natural habitat" for the entire Hackensack River watershed. The results of these studies will be reported in a series of publications.

The trends analysis study has been completed and the final report for the Meadowlands will soon be released. The trends study focused on wetland changes from the 1950s to the mid-1990s. During the study, an 1889 topographic map was used to document the general extent of wetlands at the end of the 19th Century. From this map, we determined that approximately 20,000 acres of wetlands were present in the Meadowlands study area in 1889. Analyzing recent aerial photographs, we found that as of 1995, approximately 28 percent (5,500 acres) of these wetlands remained. The greatest wetland losses took place from 1966-1976, with annual losses averaging about 300 acres. Annual losses of more than 200 acres were detected for two other time periods: from the 1950s to the mid-1960s, and from the mid-1970s to the mid-1980s. From the late 1800s to the 1950s, annual wetland losses averaged about 100 acres. Most recently, wetland losses have amounted to 20 acres per year.

The mapping of stream corridors and wetland buffers will include determination of the presence of vegetation or the nature of land use within 100 meters of the stream or wetland edge. The assessment of "natural habitat" will involve photointerpretation of major land cover and land uses in the watershed and calculation of several indices that provide a relative picture of the status of natural habitat in watersheds. From these indices, a composite called the "index of remotely-sensed natural habitat integrity" will be calculated.



Two aerial shots—top, March 1995; bottom, February 1966—of the I-95 bridge in the Meadowlands (in the 1995 photo, Sawmill Creek WMA is left of the bridge just before it crosses the Hackensack; in the 1966 photo, the sharp contours of Snake Hill are dramatically etched at the extreme right just above the bridge)

Photographs USFWS

Updated NWI digital map data for the Hackensack Meadowlands and related wetland reports will be posted on the web at **http://wetlands.fws.gov** in 2003. The first of these, the wetland trends report, is scheduled for posting by mid-winter (February 2003). This and other web-based publications will allow people to view the study results and accompanying maps on their home or office computer.

The mapping effort will provide a baseline for assessing future changes in both wetlands and other natural habitats through remote sensing. It will also give resource managers more information on the extent and relative condition of natural habitat in the Hackensack River watershed. Such information is vital for developing strategies to protect, conserve, and restore fish and wildlife habitats in this highly urbanized area.

*Robert Sullivan. 1998. *The Meadowlands: Wilderness Adventures at the Edge of a City*. New York: Scribner, pp. 172-3